

REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. Formalities

The claims and specification have been revised to place the application in proper U.S. format (including deletion of capital letters in the body of the claims and revision of “and/or” clauses), and to correct various minor typographic and idiomatic errors. Because the changes are all formal in nature, it is respectfully submitted that the changes do not involve new matter.

2. Rejection of Claims 1-4 Under 35 USC §103(a) in view of U.S. Patent Nos. 6,416,642 (Alajoki) and 5,997,518 (Laibovitz)

This rejection is respectfully traversed on the grounds that neither the Alajoki patent nor the Laibovitz patent discloses or suggests, whether considered individually or in any reasonable combination, a microfluid driving device having **two Venturi pumps** for generating oppositely-directly pumping forces in a microchannel when airflow is supplied to the respective pumps.

The Laibovitz patent discloses a **single** Venturi device, but the single Venturi device is not used to generate a pumping force in a microchannel as claimed. The Alajoki patent does not disclose any sort of Venturi device. Neither patent discloses **two** Venturi devices, and neither patent discloses Venturi **pumps** of the type claimed, for pumping fluids in different directions in a microchannel.

The Alajoki patent is generally concerned with the same problem as the present invention, namely control of fluid movement through microchannels, but does not even remotely suggest the use of airflow generated Venturi effects to pump fluids in different directions through a particular microchannel. While Alajoki does mention application of a pressure differential across a channel, the only examples of pressure differential creating

mechanisms are “hydrostatic” (by a wicking or capillary effect caused by the shape of the channel), or a “*pressure based system . . . that displaces fluid in a microfluidic channel using, e.g., a probe, piston, or pressure diaphragm*” (see, e.g., col. 8, line 62 to col. 9, line 10 of the Alajoki patent). Wicking does not give the flow rate control of the claimed Venturi pumps, while mechanical pressure generating mechanisms (as discussed in the introductory portion of the present application) are extremely difficult and costly to implement.

The microfluid device of Laibovitz, on the other hand, does employ a Venturi effect to create a pressure drop. However, the Venturi effect is not used to pump fluids in a microchannel, but rather is used in a **nozzle** to create a sudden pressure drop, so that the liquid which is released forms a very fine but intense spray. It is respectfully submitted that the use of a Venturi effect to operate a spray nozzle is not equivalent to the claimed pumping of fluids through a microchannel. The purpose of the nozzle of Laibovitz is to provide “*a practical system for delivering small microliter volumes of medicaments accurately to parts of the mammalian body*” (col. 1, lines 13-15). This has nothing to do with pumping of fluids through microchannels. Since the fluid emitted by the nozzle of Laibovitz is sprayed suddenly, the force generated by the Venturi effect is useless for controlling flow rate in a microchannel. Thus, the teachings of Laibovitz are not relevant to either the claimed invention or to the microfluid control of Alajoki, and could not have suggested modification of the Alajoki device to obtain the claimed invention.

Furthermore, it is noted that the liquid emitted by the nozzle of Laibovitz is driven by jet air in direct contact with the fluid, which would be a source of contamination for the biological and chemical screening applications, thereby providing a still further reason why the ordinary artisan would not consider using the Venturi mechanism of Laibovitz in a microchannel device of the type disclosed by Alajoki. In contrast, the Venturi pumps of the invention use the Venturi effect of airflow at opposite ends of the channel, without contact between the air and the fluid in the channel, to generate a sucking force that moves the fluid in the desired direction at the desired rate. It replaces the pneumatic pressure generating

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devices disclosed by Alajoki without the negative effects of the spray generating device of Laibovitz..

Because neither the Laibovitz patent nor the Alajoki patent discloses or suggests the claimed dual Venturi pumps for moving fluid in a microchannel, or even the concept of using a single airflow controlled Venturi pump to move fluid in a microchannel (with all the advantages of simplicity and improved control resulting therefrom), it is respectfully submitted that the rejection based on the Laibovitz and Alajoki patents is improper, and withdrawal of the rejection of claims 1-4 under 35 USC §103(a) is respectfully requested.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

BACON & THOMAS, PLLC

A handwritten signature in black ink, appearing to read 'Ben Urcia', followed by a long horizontal line extending to the right.

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